CLAIMS

5 1. A compound of formula (I),

or a pharmaceutically-acceptable salt, hydrate, or prodrug thereof, in which:

10 X is N or CH;

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 R_1 is hydrogen or C_{1-6} alkyl or is taken together with R_2 or R_3 to form a monocyclic or bicyclic aryl, cycloalkyl, heteroaryl or heterocycle;

R₂ is hydrogen, aryl, cycloalkyl, heteroaryl, or heterocyclo; or C₁₋₆alkyl or C₂₋₆alkenyl optionally substituted with one to three of hydroxy, alkoxy, halogen, cyano, trifluoromethyl, nitro, amino, alkylamino, aryl, cycloalkyl, heteroaryl, and/or heterocyclo; or R₂ is taken together with R₁ or R₃ to form a monocyclic or bicyclic aryl, cycloalkyl, heteroaryl or heterocycle;

 R_3 is hydrogen or C_{1-6} alkyl or is taken together with R_2 to form a monocyclic or bicyclic aryl, cycloalkyl, heteroaryl or heterocycle;

20 E is E_1 , E_2 , E_3 or E_4 , wherein

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- W is selected from -NR₂₁R₂₂, -OR₂₃, -NR₂₁C(=O)R₂₄, -NR₂₁CO₂R₂₄, amidino, guanidino, or a substituted or unsubstituted heterocyclo, heteroaryl, or cycloalkyl selected from azepinyl, azetidinyl, imidazolyl, imidazolidinyl, pyrazolyl, pyridyl, pyrazinyl, pyridazinyl, 1,2-dihydropyridazinyl, pyranyl, tetrahydropyranyl, piperazinyl, homopiperazinyl, pyrrolyl, pyrrolidinyl, piperidinyl, thiazolyl, tetrahydrothiazolyl, thienyl, furyl, tetrahydrofuryl, morpholinyl, isoquinolinyl, tetrahydroisoquinolinyl, tetrazolyl, oxazolyl, tetrahydro-oxazolyl, and C₃.

 7cycloalkyl, wherein said heteroaryl, heterocyclo or cycloalkyl groups may additionally have joined thereto an optionally substituted five-to-seven membered, heterocyclic, heteroaryl, or carbocyclic ring;
 - R_4 and R_7 are independently selected from hydrogen, alkyl, substituted alkyl, halogen, hydroxy, alkoxy, and keto;
- R₅, R_{5a}, R_{5b}, R₆, R_{6a}, R_{6b}, R₈ and R₉ are independently hydrogen, halogen, cyano, alkyl, substituted alkyl, alkenyl, alkynyl, cycloalkyl, heterocyclo, aryl, heteroaryl, -OR₂₅, -NR₂₅R₂₆, -SR₂₅ -S(O)_pR₂₆, -C(=O)R₂₅, -OC(=O)R₂₅, -CO₂R₂₅, -C(=O)NR₂₅R₂₆, -NR₂₅C(=O)R₂₆, -OC(=O)NR₂₅R₂₆, -NR₂₅CO₂R₂₆, -NR₂₇C(=O)NR₂₅R₂₆ or -NR₂₅SO₂R₂₆; or R_{5a} and R_{5b}, R_{6a} and R_{6b}, or R₈ and R₉ taken together form a keto group (=O) or a monocyclic or bicyclic cycloalkyl or heterocyclo joined in a spiro fashion to ring E, or alternatively, R_{5a} and/or R_{5b} together with R₈ and/or R₉, or R_{6a} and/or R_{6b} together with R₈ and/or R₉, are taken to form a fused carbocyclic, heterocyclic, or heteroaryl ring; provided that, when G is a C₁₋₆alkyl substituted with -OR₁₇, -CO₂R₁₈, or -C(=O)NR₁₈R₁₉, then R_{5a}, R_{5b}, R_{6a}, and R_{6b} are hydrogen;

R₁₀ is selected from hydrogen, alkyl, substituted alkyl, cycloalkyl, aryl, heteroaryl, and hetereocyclo;

 R_{11} is hydrogen or C_{1-8} alkyl;

 R_{12} is C_{1-8} alkyl, substituted C_{1-8} alkyl, or cycloalkyl;

R₁₃, R₁₄, R₁₅ and R₁₆ are selected independently of each other from hydrogen, alkyl, substituted alkyl, amino, alkylamino, hydroxy, alkoxy, aryl, cycloalkyl, heteroaryl, or heterocyclo, or R₁₃ and R₁₄, or R₁₅ and R₁₆, when attached to the same carbon atom, may join to form a spirocycloalkyl ring;

R₁₇ is alkyl, substituted alkyl, cycloalkyl, aryl, heterocyclo, or heteroaryl;

10 R₁₈, R₁₉, and R₂₀ are independently selected from hydrogen, alkyl, substituted alkyl, alkenyl, substituted alkenyl, aryl, heteroaryl, cycloalkyl, heterocyclo, or C(=O)R₂₈; or when G is NH(C=O)R₁₉, R₁₉ may be a bond joined to W to define a heterocyclo ring; provided, however, that when y is at least one, W is imidazolyl, indolyl, -NR₂₁R₂₂, or -OR₂₃, and G is -NR₁₈C(=O)R₁₉, then R₁₉ is not a C₁-alkyl having the substituent -NR₂₉R₃₁;

R₂₁ and R₂₂ are selected from hydrogen, alkyl, and substituted alkyl;

R₂₃ and R₂₄ are independently hydrogen, alkyl, substituted alkyl, aryl, heteroaryl, heterocyclo, and cycloalkyl;

 R_{25} , R_{26} and R_{27} are independently hydrogen, alkyl, substituted alkyl, cycloalkyl, aryl, heterocyclo, or heteroaryl; or R_{25} and R_{26} may join together to form a heterocyclo or heteroaryl, except R_{26} is not hydrogen when joined to a sulfonyl group as in $-S(O)_pR_{26}$ or $-NR_{25}SO_2R_{26}$;

R₂₈ is hydrogen, alkyl, or substituted alkyl;

R₂₉ and R₃₁ are selected from hydrogen, alkyl, haloalkyl, hydroxyalkyl, phenylalkyl, and alkoxycarbonylalkyl, or R₂₉ and R₃₁ taken together form a heterocyclo ring;

n is 0, 1, 2, 3 or 4;

p is 1, 2, or 3;

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r and s are 0 or 1;

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x is 0, 1, or 2; y is 0, 1, 2, 3 or 4; and z is 0, 1, or 2.

5 2. A compound according to claim 1, or a pharmaceutically-acceptable salt hydrate, or prodrug thereof, in which:

G is selected from:

- a) C₂₋₄alkenyl optionally substituted with phenyl;
- b) $-CO_2R_{18}$, $-C(=O)NR_{18}R_{19}$, $-NR_{18}C(=O)R_{19}$, and $-SO_2R_{17}$,
- c) C_{1-6} alkylene or C_{2-6} alkenylene joined to one of cyano, $-OR_{17}$, $-C(=O)R_{18}$, $-CO_2R_{18}$, $-C(=O)NR_{18}R_{19}$, $-NR_{18}C(=O)R_{19}$, $-NR_{18}CO_2R_{19}$, $-NR_{18}SO_2R_{17}$, $-SO_2R_{17}$, $-NR_{20}C(=O)NR_{18}R_{19}$, and $-SR_{18}$;
- d) when y is 0, or when W is a group other than NHR_{22} , G also may be selected from optionally substituted pyrrolidinyl or piperidinyl;
- R₁₇ is C₁₋₄alkyl, C₅₋₆cycloalkyl, phenyl or benzyl;
- R_{18} , R_{19} , and R_{20} are independently selected from hydrogen, $C_{1\text{-4}}$ alkyl, phenyl, benzyl, $C_{5\text{-6}}$ cycloalkyl, $-C(=O)CH_2(\text{phenyloxy})$, $-C(=O)CH_2(\text{benzyloxy})$, imidazolyl, pyridyl, furyl, thienyl, or $C_{1\text{-4}}$ alkyl or $C_{2\text{-4}}$ alkenyl substituted with one of phenyl, pyridyl, furyl, cyclopentyl, cyclohexyl, CO_2Me , phenyloxy, or benzyloxy, wherein each ringed group of R_{18} , R_{19} , and R_{20} in turn is optionally substituted with one to two R_{36} , and/or optionally has a benzene ring or five membered heterocyclo having two oxygen atoms fused thereto; and

R₃₆ is halogen, methoxy, nitro, phenyl, phenyloxy, or alkylamino.

3. A compound according to claim 2, or a pharmaceutically-acceptable salt hydrate, or prodrug thereof, in which

G is $-NR_{18}C(=O)R_{19}$,

R₁₈ is hydrogen or lower alkyl, and

R₁₉ is C₁₋₄alkyl, C₂₋₄alkenyl, phenyl, benzyl, C₅₋₆cycloalkyl, -

 $C(=O)CH_2(phenyloxy)$, $-C(=O)CH_2(benzyloxy)$, imidazolyl, pyridyl, furyl, thienyl, or C_{1-4} alkyl or C_{2-4} alkenyl substituted with one of phenyl, phenyl, pyridyl, furyl, cyclopentyl, cyclohexyl, CO_2Me , phenyloxy, and benzyloxy, wherein each ringed group of R_{19} in turn is optionally substituted with one to two R_{36} , and/or optionally has a benzene ring or five membered heterocyclo having two oxygen atoms fused thereto.

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4. A compound according to claim 2, or a pharmaceutically-acceptable salt hydrate, or prodrug thereof, in which W is OH, $-NH_2$, -NHalkyl, $-N(alkyl)_2$, azetidinyl, imidazolyl, piperidinyl, pyrrolidinyl, or $NHCO_2(alkyl)$; or a C_{4-7} cycloalkyl optionally substituted with lower alkyl, $-NH_2$, -NHalkyl, or $-N(alkyl)_2$.

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5. A compound according to claim 1, or a pharmaceutically-acceptable salt hydrate, or prodrug thereof, having the formula:

$$(R_{30})_t$$
 O
 NH
 N
 R_9
 R_9

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in which

K is phenyl or thiazolyl;

R₃₀ is selected from C₁₋₄alkyl, hydroxy, alkoxy, halogen, nitro, cyano, amino, alkylamino, phenyl, and -C(=O)phenyl;

25 t is 0, 1 or 2; and y is 0, 1 or 2.

6. A compound according to claim 1, or a pharmaceutically-acceptable salt hydrate, or prodrug thereof, in which

W is OH, $-NR_{21}R_{22}$ -NHC(=O)R₂₄, or -NHCO₂alkyl;

- R_{21} and R_{22} are independently selected from hydrogen, C_{1-8} alkyl, and $(CH_2)_q$ -J, wherein J is selected from napthyl, furanyl, indolyl, imidazolyl, pyrimidinyl, benzothienyl, pyridinyl, pyrrolyl, pyrrolidinyl, thienyl, and C_{3-7} cycloalkyl, wherein the alkyl, alkylene, and/or J groups of R_{21} and/or R_{22} are optionally substituted with up to three R_{33} ;
- 10 R_{24} is selected from C_{1-6} alkyl, trifluoromethyl, alkoxyalkyl, furylalkyl, alkylaminoethyl, phenyl, pyrollylalkyl, piperidinyl, and piperidinylalkyl, wherein R_{24} in turn is optionally substituted with one to two C_{1-4} alkyl and/or $-CO_2(C_{1-4}$ alkyl);
 - R_{33} is selected from $C_{1\text{-}6}$ alkyl, hydroxy, $C_{1\text{-}4}$ alkoxy, amino, $C_{1\text{-}4}$ alkylamino, amino $C_{1\text{-}4}$ alkyl, trifluoromethyl, halogen, phenyl, benzyl, phenyloxy, benzyloxy, $-C(=O)(CH_2)NH_2, -CO_2(C_{1\text{-}4}\text{alkyl}), -SO_2(C_{1\text{-}4}\text{alkyl}), \text{ tetrazolyl, piperidinyl,}$ pyridinyl, and indolyl, wherein when R_{33} includes a ring, said ring in turn is optionally substituted with one to two $C_{1\text{-}4}$ alkyl, hydroxy, methoxy, and/or

q is 0, 1, 2 or 3.

halogen; and

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7. A compound according to claim 1, or a pharmaceutically-acceptable salt hydrate, or prodrug thereof, in which

W is a ring selected from:

R₃₄ at each occurrence is attached to any available carbon or nitrogen atom of W and is selected from C₁₋₆alkyl, halogen, amino, aminoalkyl, alkylamino, hydroxy, C₁₋₄alkoxy, hydroxyC₁₋₄alkyl, -C(=O)alkyl, -C(=O)aminoalkyl, -C(=O)phenyl, -C(=O)benzyl, -CO₂alkyl, -CO₂phenyl, -CO₂benzyl, -SO₂alkyl, -SO₂aminoalkyl, -SO₂phenyl, -SO₂benzyl, phenyl, benzyl, phenyloxy, benzyloxy, pyrrolyl, pyrazolyl, piperidinyl, pyridinyl, pyrimidinyl, and tetrazolyl, and/or two R₃₄ when attached to two adjacent carbon atoms or adjacent carbon and nitrogen atoms may be taken together to form a fused benzo, heterocyclo, or heteroaryl ring, and/or two R₃₄ when attached to the same carbon atom (in the case of a non-aromatic ring) may form keto (=O), and each R₃₄ in turn is optionally substituted with up to two R₃₅;

15 R₃₅ is selected from halogen, trifluoromethyl, C₁₋₄alkyl, cyano, nitro, trifluoromethoxy, amino, alkylamino, aminoalkyl, hydroxy, and C₁₋₄alkoxy;

w is selected from 0, 1, or 2;u is selected from 0, 1, 2, and 3; andv is 0, 1 or 2.

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8. A compound according to claim 1, or a pharmaceutically-acceptable salt hydrate, or prodrug thereof, in which

 R_8 and R_9 are selected independently from hydrogen, alkyl, $-(CH_2)_j$ -C(=O)alkyl, $-(CH_2)_j$ -phenyl, $-(CH_2)_j$ -napthyl, $-(CH_2)_j$ - C_{4-7} cycloalkyl, $-(CH_2)_j$ -heterocyclo, and $-(CH_2)_j$ - heteroaryl, or R_8 and R_9 together form a spirocycloalkyl or spiroheterocyclic ring; and

j is selected from 0, 1, 2 and 3.

9. A compound according to claim 1, or a pharmaceutically-acceptable salt hydrate, or prodrug thereof, in which

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10. A compound according to claim 1, or a pharmaceutically-acceptable salt thereof, in which

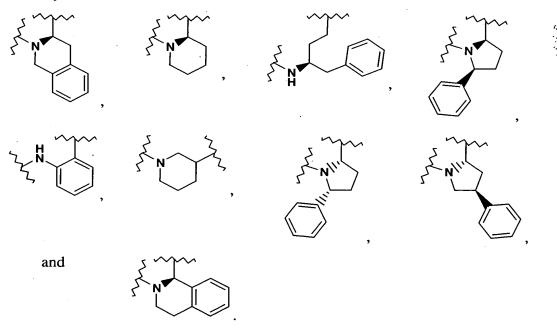
 R_2 is selected from hydrogen, C_{1-6} alkyl, C_{2-6} alkenyl, biphenyl, C_{2-6} alkenylene-K, and – $(CH_2)_g$ -K;

K is selected from phenyl, napthyl, thienyl, thiazolyl, pyridinyl, pyrimidinyl, and C_5 .

6cycloalkyl, wherein each group K in turn is optionally substituted with one to three R_{30} or has a benzene ring fused thereto, which also may be substituted with one to three R_{30} ;

R₃₀ is selected from C₁₋₄alkyl, hydroxy, alkoxy, halogen, nitro, cyano, amino, alkylamino, phenyl, and acylphenyl; and g is 0, 1, 2 or 3.

11. A compound according to claim 1, or a pharmaceutically-acceptable salt hydrate, or prodrug thereof, in which -X(R₁)-CH(R₂)-CH(R₃)_r-(CH₂)_s-, taken together are selected from C₁₋₄alkylene,



12. A compound according to claim 1, or a pharmaceutically-acceptable salt thereof, in which

X is N;

R₁ is hydrogen or C₁₋₄alkyl;

5 r is 0; and

s is 0.

- 13. A compound according to claim 1, or a pharmaceutically-acceptable salt hydrate, or prodrug thereof, in which
- G is C₂₋₄alkenyl, NHC(=O)R₁₉, SO₂R₁₇, or when y is 0, G may also be pyrrolidinyl, piperidinyl, pyrrolidinyl(lower alkyl), or piperidinyl(lower alkyl);

W is $-NR_{21}R_{22}$, $NR_{21}C(=O)R_{24}$, azetidinyl, or imidazolyl;

 R_{17} and R_{19} are lower alkyl, and when W is imidazolyl, R_{19} may be joined with W to form a heterocycle;

- 15 R_{21} and R_{22} are selected from hydrogen and lower alkyl; and y is 0, 1, or 2.
 - 14. A compound having the formula,

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or a pharmaceutically-acceptable salt, hydrate, or prodrug thereof, in which:

X is N or CH;

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R₁ is hydrogen or C₁₋₆alkyl or is taken together with R₂ or R₃ to form a monocyclic or bicyclic aryl, cycloalkyl, heteroaryl or heterocycle;

R₂ is hydrogen, aryl, cycloalkyl, heteroaryl, heterocyclo, or C₁₋₆alkyl or C₂₋₆alkenyl optionally substituted with one to three of hydroxy, halogen, aryl, cycloalkyl, heteroaryl, and/or heterocyclo; or R₂is taken together with R₁or R₃ to form a monocyclic or bicyclic aryl, cycloalkyl, heteroaryl or heterocycle;

R₃ is hydrogen or C₁₋₆alkyl or is joined together with R₂ to form a monocyclic or bicyclic aryl, cycloalkyl, heteroaryl or heterocycle;

E is E_1 , E_2 , E_3 , or E_4 , wherein

 E_4 is $-NR_{11}R_{12}$;

G is selected from:

a) C₂₋₆alkenyl optionally substituted with phenyl;

b)
$$-OR_{18}$$
, $-C(=O)R_{18}$, $-CO_2R_{18}$, $-C(=O)NR_{18}R_{19}$, $-NR_{18}C(=O)R_{19}$, $-NR_{18}CO_2R_{19}$, $-NR_{18}SO_2R_{17}$, $-SO_2R_{17}$, $-NR_{20}C(=O)NR_{18}R_{19}$, and $-SR_{18}$,

c) C_{1-6} alkyl or C_{2-6} alkenyl (straight or branched chain) substituted with at least one of cyano, $-OR_{17}$, $-C(=O)R_{18}$, $-CO_2R_{18}$, $-C(=O)NR_{18}R_{19}$, $-NR_{18}C(=O)R_{19}$, $-NR_{18}CO_2R_{19}$, $-NR_{18}SO_2R_{17}$, $-SO_2R_{17}$, $-NR_{20}C(=O)NR_{18}R_{19}$, and $-SR_{18}$;

d) when y is 0, G also may be selected from pyrrolidinyl, piperidinyl, pyrrolidinylalkyl, or piperidinylalkyl;

W is selected from -NR₂₁R₂₂, -OR₂₃, -NR₂₁C(=O)R₂₄, -NR₂₁CO₂R₂₄, amidino, guanidino, or a substituted or unsubstituted heterocyclo, heteroaryl, or cycloalkyl group selected from azetidinyl, imidazolyl, imidazolidinyl, pyrazolyl, pyridyl, pyrazinyl, pyridazinyl, 1,2-dihydropyridazinyl, pyranyl, tetrahydropyranyl,

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piperazinyl, homopiperazinyl, pyrrolyl, pyrrolidinyl, piperidinyl, thiazolyl, tetrahydrothiazolyl, thienyl, furyl, tetrahydrofuryl, morpholinyl, isoquinolinyl, tetrahydroisoquinolinyl, tetrazolyl, oxazolyl, tetrahydro-oxazolyl, and C₃. ₇cycloalkyl, wherein said heteroaryl, heterocyclo or cycloalkyl groups may additionally have fused thereto an optionally substituted five-to-seven membered heterocyclic, heteroaryl, or carbocyclic ring;

R₄ and R₇ are independently selected from hydrogen, alkyl, substituted alkyl, halogen, hydroxy, alkoxy, and keto;

R₅, R_{5a}, R₆, R₆, R₆, R₈ and R₉ are independently hydrogen, halogen, cyano, alkyl, substituted alkyl, alkenyl, hydroxy, alkoxy, alkoxycarbonyl, acyl, cycycloalkyl, heterocyclo, aryl, or heteroaryl; or R_{5a} and R_{5b}, R_{6a} and R_{6b}, or R₈ and R₉ taken together form a keto group (=O) or a monocyclic or bicyclic cycloalkyl or heterocyclo joined in a spiro fashion to ring E, or alternatively, R_{5a} and/or R_{5b} together with R₈ and/or R₉, or R_{6a} and/or R_{6b} together with R₈ and/or R₉, join together to form a fused benzene or heterocyclo ring; provided that, when G is a C₁₋₆alkyl substituted with –OR₁₇, –CO₂R₁₈, or –C(=O)NR₁₈R₁₉, then R_{5a}, R_{5b}, R_{6a}, and R_{6b} are hydrogen;

R₁₀ is selected from hydrogen, alkyl, substituted alkyl, cycloalkyl, aryl, heteroaryl, and heterocyclo;

20 R_{11} is hydrogen or C_{1-8} alkyl;

 R_{12} is C_{1-8} alkyl, substituted C_{1-8} alkyl, or cycloalkyl;

R₁₇ is alkyl, substituted alkyl, cycloalkyl, aryl, heterocyclo, or heteroaryl;

R₁₈, R₁₉, and R₂₀ are independently selected from hydrogen, alkyl, alkenyl, aryl, heteroaryl, cycloalkyl, heterocyclo, C(=O)R₂₈ or a C₁₋₄alkyl or C₂₋₄alkenyl substituted with one or more of aryl, heteroaryl, cycloalkyl, heterocyclo, alkoxycarbonyl, phenyloxy, and/or benzyloxy, and each of said ringed groups of R₁₈, R₁₉, and R₂₀ in turn is optionally substituted with one to two R₃₆;

 R_{21} and R_{22} are selected from alkyl and substituted alkyl;

R₂₃ and R₂₄ are independently selected from hydrogen, alkyl, substituted alkyl, aryl, heteroaryl, heterocyclo, and cycloalkyl;

R₂₈ is hydrogen, alkyl, or substituted alkyl;

R₃₆ is halogen, methoxy, nitro, phenyl, phenyloxy, or alkylamino;

5 n is 0, 1, 2, 3 or 4;

r and s are 0 or 1;

x is 0, 1, or 2;

y is 0, 1, 2, 3 or 4; and

z is 0, 1, or 2.

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15. A compound according to claim 14, or a pharmaceutically-acceptable salt hydrate, or prodrug thereof, having the formula:

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wherein G is C_{2.4}alkenyl, NHC(=O)R₁₉, SO₂R₁₇, or when y is 0, G may also be pyrrolidinyl, piperidinyl, pyrrolidinyl(lower alkyl), or pipridinyl(lower alkyl);

W is OH, -NH₂, NH(lower alkyl), N(lower alkyl)₂, azetidinyl, or imidazolyl, wherein the azetidinyl and imidazolyl are optionally substituted with lower alkyl;;

 R_{17} and R_{19} are lower alkyl or phenyl;

 R_{30} is C_{1-4} alkyl, hydroxy, methoxyl, ethoxy, halogen, nitro, cyano, amino, C_{1-4} alkylamino, phenyl, or C(=O)phenyl; and

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y is 0, 1, or 2.

16. A compound according to claim 15, or a pharmaceutically-acceptable salt hydrate, or prodrug thereof, in which E is

ZN N OF ZN CH₃

- 17. A compound according to claim 14, or a pharmaceutically-acceptable salt thereof, in which G is NHC(=O)(alkyl) or NHC(=O)phenyl.
 - 18. A compound according to claim 1, having the formula,

$$C_{1} = 0$$

$$H_{N} = 0$$

$$H_{N$$

or a pharmaceutically-acceptable salt, hydrate or prodrug thereof.

5 19. A pharmaceutical composition comprising at least one compound according to claim 1 or a pharmaceutically-acceptable salt hydrate, or prodrug thereof; and a pharmaceutically-acceptable carrier or diluent.

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- 20. A pharmaceutical composition comprising (i) at least one compound according to claim 1 or a pharmaceutically-acceptable salt hydrate, or prodrug thereof; (ii) at least one second compound effective for treating an inflammatory or immune disease, a cardiovascular disease, or a neurodegenerative condition; and (iii) a pharmaceutically-acceptable carrier or diluent.
- 21. The pharmaceutical composition according to claim 20 in which the at least one second compound comprises a phosphodiesterase inhibitor.
- 10 22. A method of treating a melanocortin-receptor associated condition, the method comprising administering to a warm-blooded species in need of such treatment a therapeutically-effective amount of at least one compound according to claim 1.
- 23. The method of claim 22 in which the melanocortin-receptor associated condition is an MC-1R or MC-4R condition.